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BOX PATENT APPLICATION  
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Washington, D.C. 20231.

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re application of:

NICHOLAS L. ABBOTT et al.

Continuation of Application  
No.: 09/898,132

Filed: July 3, 2001

For: OPTICAL AMPLIFICATION OF  
MOLECULAR INTERACTIONS USING  
LIQUID CRYSTALS

Examiner: Celsa, B.

Art Unit: 1627

PRELIMINARY AMENDMENT

BOX PATENT APPLICATION  
Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Prior to examination of the above-referenced application, please enter the  
following amendments and remarks.

**IN THE SPECIFICATION:**

On page one, please delete the paragraph below the title "CROSS-  
REFERENCES TO RELATED APPLICATIONS" on line 16, and add the following new  
paragraph:

This application is a Continuation of U.S. Application No. 09/898,132,  
filed July 3, 2001, which is a Continuation of U.S. Application No. 09/127,382 filed

July 31, 1998, which is a Continuation-in-Part of U.S. Application No. 09/092,453, filed June 5, 1998, the disclosures of which are incorporated herein by reference for all purposes.

**IN THE CLAIMS:**

Cancel claims 1-120. Add claims 1-8.

1. A device for the detection of ligands comprising:

at least one receptor capable of binding to a ligand to form a receptor-ligand complex, wherein the formation of the receptor-ligand complex produces a signal; and

an amplification mechanism, wherein said amplification mechanism is a lyotropic liquid crystalline material coupled to the receptor, and wherein said amplification mechanism amplifies said signal upon receptor-ligand complex formation.

2. The device of claim 1, wherein the receptor is an antibody selected from the group consisting of monoclonal, polyclonal and molecularly engineered antibodies, wherein said antibodies form a signal-producing receptor-ligand complex when the receptor binds to the ligand.

3. The device of claim 1, wherein the ligand is a pathogenic agent.

4. The device of claim 1, wherein the amplified signal is generated by a change in optical characteristics of the lyotropic liquid crystalline material.

5. A device for the detection and monitoring of the presence of ligands comprising:

multiple wells, each well having a predetermined receptor therein, wherein said receptor is capable of binding to a ligand, and wherein the formation of the receptor-ligand complex produces a signal; and

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an amplification mechanism, wherein said amplification mechanism is a lyotropic liquid crystalline material coupled to the predetermined receptor, and wherein said amplification mechanism amplifies said signal upon binding of a specific ligand to its predetermined receptor.

6. The device of claim 5, wherein the receptor is an antibody, wherein said antibody forms a signal-producing receptor-ligand complex upon ligand binding.

7. The device of claim 6, wherein the antibody is selected from the group consisting of monoclonal, polyclonal and molecularly engineered antibodies.

8. The device of claim 5, wherein the amplified signal is transduced into an optically perceptible signal.

### REMARKS

#### Status of the Claims

Claims 1-8 are pending in the present application. The addition of each of claims 1-8 is fully supported by the specification as filed. The elements of the claims and the interactions of the elements are supported throughout the specification, including the examples. Specific examples of written support include, for claim 1, the element of a receptor capable of binding to a ligand is found at page 8, lines 13-16 ("contacting with the analyte a recognition moiety for the analyte."). The element of forming a receptor-ligand complex is found at page 52, lines 28-32. The element of using a lyotropic liquid crystal is found at page 20, lines 21-23. The element of amplifying the binding interaction is found at page 47, lines 20-24.

For claim 2, different antibody motifs useful in practicing the invention are found at page 45, lines 1-2, 5 and 8. For claim 3, support is found at page 52, lines 26-28 and page 57, lines 7-13. The language on page 52 makes it clear that the disclosed invention is of use to detect any species that interacts with the recognition moiety.

Detection of a pathogen requires the binding of the recognition moiety to a group, e.g., protein or carbohydrate on the surface of the pathogen, or a cellular component such as a nucleic acid produced by the pathogen. Support for claim 4, reciting that the amplified signal is generated by a change in optical characteristics in a lyotropic liquid crystalline material, is found at page 57, line 11.

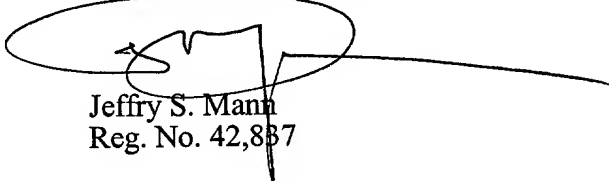
Support for a device utilizing multiple wells is found at page 27, line 5.  
The elements of claims 6 and 7 and the location of support correspond to those of claims 1-4. Claim 8 finds support at page 60, lines 22-27.

CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance. The issuance of a formal Notice of Allowance at an early date is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 415-576-0200.

Respectfully submitted,



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**VERSION WITH MARKINGS TO SHOW CHANGES MADE**

**IN THE SPECIFICATION**

On page one, please delete the paragraph below the title "CROSS-REFERENCES TO RELATED APPLICATIONS" on line 16, and add the following new paragraph:

--This application is a Continuation of U.S. Application No. 09/898,132, filed July 3, 2001, which is a Continuation of U.S. Application No. 09/127,382 filed July 31, 1998, which is a Continuation-in-Part of U.S. Application No. 09/092,453, filed June 5, 1998, the disclosures of which are incorporated herein by reference for all purposes.--

Cancel claims 1-120. Add claims 1-8.

1           1.       (New) A device for the detection of ligands comprising:  
2                   at least one receptor capable of binding to a ligand to form a receptor-  
3 ligand complex, wherein the formation of the receptor-ligand complex produces a signal;  
4 and

5                   an amplification mechanism, wherein said amplification mechanism is a  
6 lyotropic liquid crystalline material coupled to the receptor, and wherein said  
7 amplification mechanism amplifies said signal upon receptor-ligand complex formation.

1           2.       (New) The device of claim 1, wherein the receptor is an antibody  
2 selected from the group consisting of monoclonal, polyclonal and molecularly engineered  
3 antibodies, wherein said antibodies form a signal-producing receptor-ligand complex  
4 when the receptor binds to the ligand.

1           3.       (New) The device of claim 1, wherein the ligand is a pathogenic  
2 agent.

1           4.       (New) The device of claim 1, wherein the amplified signal is  
2 generated by a change in optical characteristics of the lyotropic liquid crystalline  
3 material.

1           5.       (New) A device for the detection and monitoring of the presence of  
2 ligands comprising:

3                   multiple wells, each well having a predetermined receptor therein, wherein  
4 said receptor is capable of binding to a ligand, and wherein the formation of the receptor-  
5 ligand complex produces a signal; and

6                   an amplification mechanism, wherein said amplification mechanism is a  
7 lyotropic liquid crystalline material coupled to the predetermined receptor, and wherein  
8 said amplification mechanism amplifies said signal upon binding of a specific ligand to  
9 its predetermined receptor.

1           6.       (New) The device of claim 5, wherein the receptor is an antibody,  
2 wherein said antibody forms a signal-producing receptor-ligand complex upon ligand  
3 binding.

- 1                    7.        (New) The device of claim 6, wherein the antibody is selected  
2        from the group consisting of monoclonal, polyclonal and molecularly engineered  
3        antibodies.
- 1                    8.        (New) The device of claim 5, wherein the amplified signal is  
2        transduced into an optically perceptible signal.

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